ADOPTION OF NEW BEAN CULTIVARS FOR RAINFED CONDITIONS IN ZACATECAS, MEXICO[1]

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The overall process, from technology development by scientist to adoption by farmers, may consume a decade or more. Much of this time is spent in the process of technology transfer. Understandably, farmers are often reluctant to change their farming methods because the potential for making errors while learning a new agronomic practice can lead to substantial economic risk. This is difficult for farmers to accept when their profit margins are narrow. To reduce farmers reluctance to adopt new technologies, they need to see convincing tests-- such as large demonstrations plots which are managed under farming conditions similar to their own-- before they are willing to accept the risk of changing an agronomic practice (Rzewnicki, 1991). Even when a farmer commits himself to applying a new agronomic practice, a period of learning and adaptation is necessary. The state of Zacatecas, in the Northwest region of the Mexican highlands (>300,000), is the most important compact area for dry bean production under rainfed conditions. In this region, approximately 80% of the area is planted to the traditional black-seeded landrace Negro Bola San Luis.

The objective of this research was to demonstrate the superior performance of eight dry bean cultivars grown in farmers' fields (under rainfed conditions) in Zacatecas—the heart of Mexico's main bean-producing area. At the onset of the 1999 rainy season, four plots were established in farmers' fields in the northwest region in the state. Each plot included seven or eight dry bean cultivars: Pinto Mestizo, Pinto Bayacora, Flor de Mayo M38, Flor de Mayo Sol, Azufrado Namiquipa, Bayo Madero, Negro Altiplano and Negro Durango. In addition, the traditional black-seeded, full-season landrace, Negro Bola San Luis, was included as a check. . Plot size ranged from 1.2 to 1.5 hectares and planting dates varied from July 12 to 14. The collaborating farmers performed all agronomic practices In each plot, a field day was held when the cultivars were near physiological maturity, so farmers could observe the plant type and pod load of each cultivar. Small containers with the seed of each cultivar were also displayed. Each field day participant was provided a wooden stick and asked to walk through the fields and choose his/her preferred cultivar. At harvest, the seed yield of each plot was determined (kg ha^{-1}).

During 1999, one-half of the total area planted to dry beans in the state of Zacatecas was lost due to intermittent drought stress. In the area where the demonstration plots were established, the rainfall was similar to the long term average in two of the sites. In the other two sites, La Honda and Gonzalez Ortega, severe drought stress limited yield.

On the basis of seed yield, the outstanding cultivars were: Azufrado Mamiquipa and the landrace Negro Bola San Luis in Progreso; Flor de Mayo Sol and Pinto Bayacora in Gonzalez Ortega; and Pinto Bayacora, Flor de Mayo Sol and Azufrado Namiquipa in Exhacienda Zaragoza. In La Honda, the dryest and lowest yielding site, all bred cultivars showed higher yield than the traditional cultivar, Negro Bola San Luis (Table 1). These results indicated that the earliness of the bred cultivars helped them to cope with the intermittent drought stress that occurred across the test sites.

Three hundred and eight farmers attended the field days in the demonstrations plots. Farmers' preferences regarding the bred cultivars differed among sites (Table 1). At Progreso and Exhacienda Zaragoza, farmers most frequently selected the black-seeded cultivars Negro Altiplano and Negro Durango In Gonzalez Ortega and La Honda, farmers preferred the light-colored cultivars: Pinto Bayacora, Pinto Mestizo, Azufrado Namiquipa, and Bayo Madero. Farmers preferred the bred cultivars--in contrast to traditional Negro Bola San Luis--due to their early flowering and harvest maturity, relative high yield under drought stress, and plant architecture. The local landrace, a high-yielding genotype, was extremely late in maturity.

In general, farmers commented that they were impressed by the earliness and plant architecture of the bred cultivars and their adaptation under the stressful conditions of the 1999 rainy season. In addition, farmers requested INIAP to develop early cultivars with high yield potential in the seed classes of local landraces: Negro Bola, Flor de Junio and Flor de Mayo types.

Table 1. Seed yield under rainfed conditions and farmer's preferences for bred dry bean cultivars in four sites of Zacatecas, Mexico. 1999

Cultivar	Yield kg ha^{-1}				Preferences (%)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Pinto Mestizo	611	277	918	194	0	14	0	24
Pinto Bayacora	773	625	1013	103	0	66	5	17
Flor de Mayo M38	746	269	---	158	0	0	---	2
Flor de Mayo Sol	---	759	1135	232	---	3	10	14
Azufrado Namiquipa	890	310	1102	164	0	12	9	0
Bayo Madero	520	247	992	170	0	2	1	29
Negro Altiplano	717	141	814	114	65	3	43	14
Negro Durango	764	---	875	---	35	---	31	---
Bola San Luis	814	470	987	50	---	---	---	---

(1) Progreso; (2) González Ortega; (3) Exhacienda Zaragoza; (4) La Honda.

Reference:

Rzewnnicki, P.E. 1991. Farmer's perceptions of experiment station research, demonstrations and on-farm research in agronomy. J. Agron. Edu. 20: 31-36.